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429

ARINC 429 TRANSMITTER/RECEIVER

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MAINTENANCE/OVERHAUL MANUAL

429

ARINC 429 TX/RX

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SECTION I
GENERAL INFORMATION

1.1 INTRODUCTION

This manual provides operational procedures, calibration procedures and maintenance information for the JcAir Model 429 - ARINC 429 Transmitter/Receiver.

1.2 EQUIPMENT DESCRIPTION

The JcAIR Model 429 Transmitter/Receiver provides avionics and line maintenance personnel with an easy to use, low cost method for troubleshooting ARINC 429 avionic systems.

The unit features one 429 transmitter and one 429 receiver, each off which can operate independently or simultaneously. The 429 is housed in a rugged, compact case with internal, rechargeable batteries for portable operation.

The data is presented via a liquid crystal display (LCD) of the 8 bit label field in octal, bits 32 through 9 in hex, a binary display of SDI and SSM, odd or even parity display and word repetition rate displayed in milliseconds.

1.3 TECHNICAL CHARACTERISTICS

WEIGHT:	3.0 lbs. (1.36 kg)
DIMENSIONS:	
Height:	7.25 in. (18.42 cm)
Width:	4.5 in. (11.43 cm)
Depth:	2.5 in. (6.35 cm)
POWER REQUIREMENTS:	Six (6) internally mounted AA size rechargeable NiCad batteries.
OPERATING TEMPERATURE:	-10 to +60 degrees C
ARINC SPECIFICATION:	Conforms to Mark 33 Digital Information Transfer System (DITS) 429-7 unless otherwise noted.

ARINC 429 TRANSMITTER

Pulse Rise/Fall Time:	Low Speed	10.0 ±5.0 uS
	High Speed	1.5 ±0.5 uS

NOTE
Pulse rise and fall times are measured between the 10% and 90% voltage amplitude points on the leading and trailing edges of the pulse.

Voltage Levels (line A to B):	HI	+10.0 ±1.0VDC
	NULL	0.0 ±0.5VDC
	LO	-10.0 ±1.0VDC

Output Impedance:	75 ±5 ohms (Line A to B)
Bit Rate:	12.5 or 100 kbps ±1.0% (selectable)
Word Rate:	5 to 4095 mS (selectable)
Parity:	Odd or Even (selectable)

ARINC 429 RECEIVER

Voltage Levels (line A to B):	HI	+6.5 to +13.0VDC
	NULL	+2.5 to - 2.5VDC
	LO	-6.5 to -13.0VDC
Bit Rate:	Low Speed	8 to 20 kbps
	High Speed	80 to 125 kbps
Word Rate Accuracy:	±2 mS (average)	
Input Impedance:	12K ohms minimum (balanced)	

1.4 UNITS AND ACCESSORIES SUPPLIED

QTY	DESCRIPTION	JcAIR P/N
1	Model 429, ARINC 429 TX/RX	01-0001-00
2	Phone Plug, 2 Conductor	33-1033-01
1	Battery Charger, 110VAC to 9VDC, 500mA	15-0009-00

1.5 OPTIONAL ACCESSORIES

For international use, the 110VAC battery charger can be substituted with the 220VAC battery charger listed below.

QTY	DESCRIPTION	JcAIR P/N
1	Battery Charger, 220VAC to 9VDC, 500mA	15-0009-01

SECTION II
INSTALLATION

2.1 GENERAL INFORMATION

This section contains information relating to the unpacking and inspection of the unit. Also included is information concerning charging of the internal batteries and an explanation of the Unit Self Test routine.

2.2 UNPACKING AND INSPECTION

Carefully remove the JcAIR Model 429 and battery charger from the packing box. Visually inspect the units for any damage incurred during shipment. Should there be signs of damage, save the packing box to show the shipping company when submitting your claim. It is generally a good idea to save the packing box should it become necessary to store or ship the unit.

2.3 EQUIPMENT INSTALLATION

2.3.1 BATTERY CHARGING

The batteries were fully charged when the unit was shipped from the factory. However, if the unit has been stored for an extended period of time, the batteries may have become discharged. Plug the charger into an appropriate voltage outlet (U.S. as well as international chargers are available). A 4 to 5 hour charge should refresh the batteries. The Model 429 may be operated while charging or with the charger disconnected. With fully charged batteries, the unit will operate for approximately four to six hours.

2.3.2 CONNECTION TO USER EQUIPMENT

Connect the JcAIR Model 429 output (TX jack) to the input of the UUT and the JcAIR Model 429 input (RX jack) to the output of the UUT using standard 1/4 inch 2-conductor phone plugs.

2.4 POST INSTALLATION CHECK

2.4.1 UNIT SELF TEST

Turn the Model 429 on by moving the slide switch to the ON position. The unit performs a self test routine on initial power up. The following tests are performed:

It begins by checking its own Eprom by summing all its memory locations and comparing the result to the known checksum. If the checksums do not match, the unit signals a checksum error by flashing the even parity LED. If the entire Eprom has failed, however, or if one of the locations in the checksum test routine is bad, the pro-

gram will not be able to execute properly and the LCD display will show a random line of characters.

Once the Eprom has tested OK, the unit does a complete RAM test by writing alternate ones and zeroe to each RAM location, then reading the bite back for confirmation. If a RAM error occurs, the unit will respond by blinking the odd parity LED.

If both RAM amd Eprom test correctly, the unit tests the LCD displav by first sending it a cursor position command, and then reading back and verifying the intended cursor position. A faultv LCD displav module will cause the unit to flash the TX displav mode LED.

Finally, the unit tests its internal programable timer chip by sending it a count-down command and verifying that it times out within the proper period. If the chip has failed, the unit will display the message "BITE FAIL:TIMER" on the LCD display. Otherwise, the test has been successfully completed and the unit will display "BITE TEST OK" for approximately two seconds. It will then proceed to the operational receive mode, where the first 429 word that it receives is immediately displayed.

SECTION III
OPERATION

3.1 GENERAL OPERATION DESCRIPTION

The JcAIR Model 429 is a single channel ARINC 429 transmitter and receiver. It can receive and display all ARINC 429 labels per ARINC Specification 429-7.

The transmitter and receiver can operate at either 100 kbps (High Speed) or 12.5 kbps (Low Speed). Each mode's speed can be set independently of the other. The parity of the words being transmitted can be set for either ODD or EVEN. An LED indicator will show the parity selected for transmitted words in the TX mode or the parity of the currently displayed word if in the RX mode.

3.1.1 DISPLAY OF DATA

The unit will display (from left to right), the label (bits 1-8) in three octal characters (001-377), followed by the SDI (bits 10-9) in two binary characters (00-11), the data field (bits 32-9) in six hex characters (000000-FFFFFF) and the SSM (bits 31-30) in two binary characters (00-11).

"LABEL" Field — Bits 1 through 8 of the 32 bit 429 word are displayed in this field as three octal characters (0 through 7). Labels 000 through 377 octal may be displayed ln this field.

"SDI" Field — Bits 9 & 10 of the 32 bit word are displayed in both the SDI field and in the DATA field. In the SDI field these bits are displayed in binary format as either a "1" or a "0".

"DATA" Field — Bits 9 through 32 Of the 32 bit word are displayed in this field in up to six hexadecimal characters (000000 through FFFFFF). The characters represent the hexadecimal equivalent of bits 32-9 (starting with bit 32) in six 4-bit bytes. Each 4-bit byte is derived from the BCD equivalent of the binary value.

For example:

Data Field in Binary - 1001 0010 1111 0001 1010 0101

Equivalent Hex Value - 9 2 F 1 A 5

"SSM" Field — Bits 30 and 31 are displayed in this fleld in binary format and are included in the DATA field as well.

"RATE Field" Displays average word interval in milliseconds for the displayed 429 word (RATE/DATA slide switch must be set to RATE).

The JcAIR Model 429 display is used to display either the transmitted word or received information. LED's at the top of the unit indicate which information is being displayed.

Parity as either odd or even is displayed by the LED pair at the side of the display. When the display is being used for transmitted information, the LED's indicate the transmit word parity. When displaying a received word, the LED's indicate the parity of this word.

3.1.2 RECEIVE MODE

On initial power-up, after the "BITE TEST" has completed, the unit goes into the Receive Mode. If no 429 words are being received, the unit will display "429 RCVR IDLE". Once 429 words are being received, the unit will display the first 429 label that it receives. If more than one label is on the bus, the labels and associated data may he viewed one at a time by pressing the Receiver Step (RX STP) key. Each time this key is pressed, the label being displaved is advanced to the next label on the bus. When the last label is being displayed, pressing the "RX STP" key causes the unit to display the first label.

The number of labels being received may be viewed at any time by pressing the Receiver Label (RX LBL) key.

To look at or for a specific label and SDI expected to be on the bus, the TRAP mode of the JcAIR Model 429 is used. This mode is activated by pressing the Receiver Trap (RX TRP) key. When this key is pressed, a blinking "cursor" is displayed in the LABEL field (bits 1-8). Enter the label desired by pressing the appropriate keys and then the "ENT" key (i.e. Label 210 would be entered by the following key sequence: 2-1-0-ENT). The unit now displays "XX" with the blinking "cursor" in the SDI field (bits 9-10). Enter the SDI desired, followed by "ENT" (10,01,00,11). If a particular SDI is not desired, press the "ENT" key without entering an SDI and the unit will display all SDI's on the bus for the selected label. If the selected label is not on the bus, the unit will display "dashes" in the DATA field and the SSM field.

The "RX SPEED" switch should be set to either the HI or LO position depending on which type of bus is being monitored.

The average rate (interval) the selected word is being received on the bus is displayed in milliseconds. The RATE Field is selected using the "Display" ("RATE/DATA") switch.

The display is transferred to receive mode tv pressing any of the receive keys ("RX TRP", "RX LBL", "RX STP").

3.1.3 TRANSMIT MODE

The display is transferred to transmit mode by pressing one of the transmit keys ("TX LBL", "TX DAT", "TX RAT"). When one of these keys is depressed, the unit is set up for data entry into the appropriate field. To maintain the information being transmitted without change, press the "ENT" key.

Pressing the Transmit Label (TX LBL) key causes a blinking cursor to appear in the "Label" field. The desired label is entered by pressing the keys in sequence followed by "ENT". Leading zeros need not be entered (i.e. Label 021 is entered by the following key sequence: 2-1-ENT). Entering label "0" turns the transmitter OFF. The label field will accept labels from 0 to 377 octal. Labels which exceed 377 are not valid, and the unit will disallow their entry. Keys not in the octal range (0 through 7) are not allowed.

Pressing the Transmit Data (TX DAT) key causes a blinking cursor to appear in the "DATA" field. The desired data is entered in hexadecimal by pressinq the proper keys followed by "ENT". When the data is entered, the SDI (bits 9 & 10) and the SSM (bits 30 & 31) are displayed in binarv format in the SDI and SSM fields as well as in the DATA field.

The paritv bit (bit 32) is automatically changed from a "1" to an "0" depending on the data and on the position of the TX paritv switch (EVEN/ODD).

Pressing the Transmit Rate (TX RAT) key causes a blinking cursor to appear in the RATE field. The rate of transmission desired for the transmitted word is set by enterinq the desired period in milliseconds. Intervals between 5 milliseconds and 4095 milliseconds (in 1mS increments) are allowed. When the rate is entered, the display will revert to the "SDI", "DATA", and "SSM" fields if the "display" switch is in the "DATA" position.

The Transmit Speed (TX SPEED) switch should be set in the HI or LO position depending on the transmit speed required by the 429 word.

3.2 CONTROL FUNCTIONS

3.2.1 Model 429 CONTROLS AND INDICATORS (see Fig. 3-1)

(1)	TX Output Port	Allows access to transmitter port using standard 2-conductor, 1/4" phone plug.
(2)	TX/RX Indicator	LED indicates that the system is in either the transmitter or receiver mode of operation for display and entry of data.
(3)	RX Input Port	Allows access to receiver port using standard 2-conductor, 1/4" phone plug.

(4)	PARITY Indicator	IN RX MODE: LED Indicates parity (Odd or Even) of word presently displayed. IN TX MODE: LED Indicates selected transmit parity.
(5)	SSM Display	LCD display of bits 31 & 30 in binary.
(6)	DATA/RATE Display	LCD display of bits 32 through 9 in six hex digits or of word rate in milliseconds.
(7)	RX SPEED Switch	Allows operator to select HI (100 kbps) or LO (12.5 kbps) RX speed.
(8)	DATA/RATE DISPLAY Switch	Selects LCD display of word rate or hex data.
(9)	RX STEP Key	Receiver step-thru label key which allows operator to sequentially examine each label being received.
(10)	ON/OFF Switch	Turns the unit ON or OFF.
(11)	ENT (Enter) Key	Completes an entry sequence.
(12)	TX RATE Key	Allows operator to enter the transmitter word rate in milliseconds.
(13)	DATA ENTRY Keys	Allows operator to enter the various alphanumeric characters for data entry.
(14)	TX DATA Key	Allows operator to enter the desired transmit data.
(15)	TX LABEL Key	Allows operator to enter the desired transmit label.
(16)	RX TRAP Key	Allows operator to enter received Label/SDI combination to be displayed.
(17)	RX LABELS Key	When pressed, displays the number of different Label/SDI combinations to be displayed.
(18)	TX Parity Switch	Allows operator to select ODD or EVEN transmission parity.
(19)	TX SPEED Switch	Allows operator to select HI (100 kbps) or LO (12.5 kbps) transmission rate.
(20)	SDI Display	LCD display of bits 10 & 9 in binary.

(21) LABEL Display	LCD display of octal label being transmitted or received.
(22) Battery Charging Jack	Allows the internal batteries to be charged by connecting to the battery charger furnished with the 429.

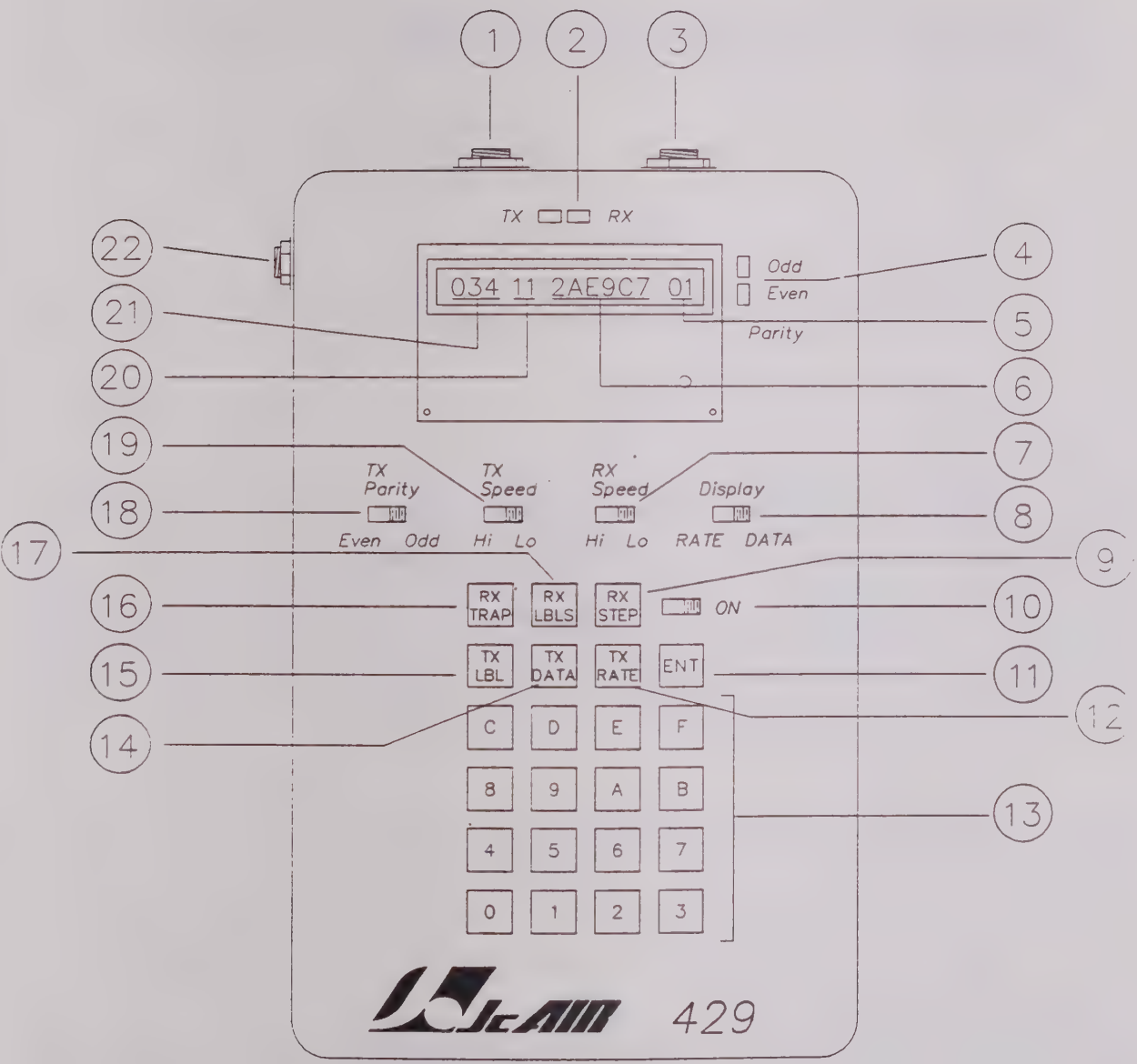


Fig. 3-1: Controls and Indicators
(Dwg. No. 40-0001-00, Rev. 0)

SECTION IV
THEORY OF OPERATION

4.1 GENERAL CIRCUIT THEORY

The JcAIR Model 429, ARINC 429 Transmitter/Receiver consists of three board level sub-assemblies and a battery pack. The three boards are :

1) Display Board (JPN 20-5037-00)
2) Digital Board (JPN 20-5037-01)
3) Analog Board (JPN 20-5037-02)

4.1.1 DISPLAY BOARD

The Display board performs the human interface function for the Model 429. It has three major sections of circuitry:

1) Display circuits
2) Keypad circuits
3) Slide Switch circuits

The Display circuits output data in visual form. The display circuits consist of the liquid crystal display (DS101), the LED's (CR1 thru 4) and the 74C374 Octal D-Type Flip-Flops (U3,4) which drive them. The Keypad switches allow data to be input to the unit. The keypad circuit consists of 23 momentary contact switches (S6 - S28) which are arranged in an X/Y matrix and are decoded by the 74C922 Key Encoders (U1,2). The slide switches allow various I/O information (Parity, TX Baud, etc.) to be changed and to turn the unit on and off. The slide switch circuits consist of 5 SPST slide switches (S1 - S5) which connect directly to the Digital board.

4.1.2 DIGITAL BOARD

The Digital board contains the digital circuitry for the 429. This circuitry has three major sections:

1) Control circuits
2) 429 Receiver
3) 429 Generator

The Control circuits are the 'Heart' of the system that controls and monitors all other circuits in the system. The control circuits consist of the following components:

1) Microcontroller (U4)
2) Firmware EPROM (U5)
3) RAM (U2,3)
4) Decoder (U1)
5) Timer (U7)

The 429 data, after being converted to TTL levels by the Analog Board, is received by U13 which sends the data to the Serial Parallel shift register, U8. The data from U8 is loaded onto the data bus 8 bits at a time where it is processed and sent to the Display Board for readout.

Slide switch position and receiver rate information is detected and stored in Latch (U6) until enabled and transferred onto the data bus for processing.

The 429 Generator circuits send TTL level bit stream data to the Analog board, where it is converted to the correct levels for output. The Generator is loaded and started by the Control circuits.

4.1.3 ANALOG BOARD

The Analog board contains the analog circuitry for the Model 429. This circuitry has three major sections:

1) Power Circuits
2) 429 Receiver
3) 429 Driver

The Power circuits supply power to the system from one of two sources. If the battery charger is disconnected, the circuits supply power to the system from the battery pack. The battery voltage is monitored by the power circuits. Should the voltage drop to an insufficient level, it is the power circuits that will indicate this to the Control circuits. An indication of low power will be seen on the display board should the aforementioned conditions exist. If the charger is connected, the power circuits will supply power to the system from the charger and will also trickle charge the NiCad batteries. The power circuits consist of the following components:

1) Low Drop Out Regulator (U5)
2) Voltage converter (U6)
3) Monitor (U7)

The 429 Receiver circuits convert ARINC 429 RZ transmitted signals form 10V levels (between A & B) to TTL level signals for use by the 429 Receiver Buffer on the Digital board. The 429 receiver circuits consist of a Comparator U4 and a number of discrete components. The 429 driver circuits convert the TTL level signal from the digital board into 10V (between A and B) ARINC 429 compatible signal levels. The 429 Driver circuits consist of the following components:

1) "1" Driver (U2, Q1, Q2)
2) "0" Driver (U3, Q3, Q4)
3) Speed Switch (U1)

The battery Pack supplies power to the system and consists of the following components:

1) Battery Holder,
2) Six (6) 'AA' NiCad rechargeable batteries.

SECTION V
MAINTENANCE

5.1 INTRODUCTION

The maintenance section contains test and alignment procedures for a JcAIR Model 429 ARINC 429 Transmitter/Receiver. Also included are bills of material, assembly drawings and schematics to assist in troubleshooting.

5.2 TEST AND ALIGNMENT

5.2.1 TEST EQUIPMENT REQUIRED

DVM	Fluke 8050A or equivalent
Power Supply	Heathkit IP-27 or equivalent
Oscilloscope	Tektronics 465 or equivalent

5.2.2 ALIGNMENT AND CALIBRATION PROCEDURE

No alignment or calibration is required.

5.2.3 TEST PROCEDURE

This specification defines the procedure to be used for the complete testing of the JcAIR Model 429. This procedure provides an orderly sequence of tests to ensure a completely tested unit.

5.2.3.1 Initial Test Setup

Set slide switches to the following positions:

ON/OFF	OFF
TX PARITY	ODD
TX SPEED	LO
RX SPEED	LO
DISPLAY	DATA

If necessary, install a fresh set of batteries into the unit and plug the charger into the unit. Allow the unit to charge at least 15 hours with the unit turned on before finishing test procedure.

5.2.3.2 Power Supply Test

_____ 1. With the unit OFF and the charger unplugged, measure the battery voltage at E7 & E8 and verify that it is greater than 8.1 VDC.

2. Remove the "+" battery lead from E7 on the P.C. board. Install a mA meter to the battery lead and the cathode of CR1 and verify the following:

a. With the unit ON, the 429 shall draw less than 65mA.
b. With the unit ON and the charger plugged in, the batteries shall be charging between 0 and 25mA.
c. With the unit OFF and the charger plugged in, the batteries shall be charging less than 60mA.

3. Turn unit OFF. Remove charger and ammeter. Hook an external power supply set for 10VDC to the following points: "+" lead to the cathode of CR1 and the "-" lead to ground. Turn the 429 ON and verify the following conditions:

a. When the supply voltage is set for 5.15 ±.05 VDC, the display shall flash "LOW BATTERY!" every 7-12 seconds.
b. When the supply voltage is brought up to 5.75 ±.05 VDC, the 429 shall cease displaying "LOW BATTERY!".

4. Turn the unit OFF, remove external supply and install battery lead back to E7 on P.C. board. Turn unit ON and verify the following:

a. The display shall read "BITE TEST OK" for approximately 1 second.
b. The display shall then read "429 RCVR IDLE".
c. The 'RX' LED shall be lit.
d. The voltage measured on pin 18 of U1 of the display board is between 4.75 and 5.25 VDC.
e. The voltage measured at R16 of the analog board is between -6.3 and -7.2 VDC.

5.2.3.3 Operational Test

1. Verify the proper operation of the 429 unit by jumpering the transmitter to the receiver.

2. Enter the following information using the following keystrokes:

TX LBL - 012 ENT
TX DAT - 345678 ENT
TX RAT - 9 ENT

3. Verify the following:

a. The display reads "012 00 345678 01".
b. The 'TX' LED is lit.
c. The 'Odd' LED is lit.
d. When the display switch is on 'Rate' the display reads "012 9M". Switch the display switch back to 'Data'.

4. Press the 'RX LBL' key and verify that 1 label is being received.

5. Press the 'RX STP' key and verify the following:

   a. Label = 012
   b. SDI = 00
   c. Data = 345678
   d. SSM = 01
   e. RX and Odd LEDs are lit.

6. Switch the 'TX Parity' switch to 'Even' and verify the following:

   a. The 'Even' parity LED is lit.
   b. Data changes to B45678.

7. Switch the display switch to 'Rate' and verify that the displayed rate is 9 MS. Switch the display switch back to 'Data' .

8. Press the 'RX TRP' key and enter: Label = 012 and SDI = 01. Verify that dashes are displayed.

9. Press the 'RX TRP' key and enter: Label = 012 and SDI = 00. Verify the displayed data = B45678.

10. Enter the following information using the following keystrokes:

    TX LBL - 377 ENT
    TX DAT - ABCDEF ENT
    TX RAT - 25 ENT

11. Press the 'RX STP' key twice and verify that:

    a. Label = 377
    b. SDI = 11
    c. Data = 2BCDEF
    d. SSM = 01

5.2.3.4 Signal Integrity Test

1. Connect channel 1 of an oscilloscope between ground and channel A of the transmitter output jack (tip) and channel 2 of the oscilloscope between ground and channel B (ring). Observe the waveforms and verify the following:

   a. The output is TRI-STATE.
   b. The amplitude is ± 5 $\pm .5$V peak to peak.
   c. The period of the data word is 2.56 $\pm .1$mS.
   d. The time between data words is 25 ± 2mS.
   e. The pulse rise and fall times are 10 ± 5.0uS as measured between the 10% and 90% voltage amplitude points on the leading and trailing edges of the pulse.
   f. The signal on channel 1 of the scope is the exact inverse of the signal on channel 2.

2. Set 'RX Speed' switch to 'Hi' and verify that within 3 seconds the unit displays dashes and the parity LEDs go out.

3. Set the 'TX Speed' switch to 'Hi' and verify the proper information is displayed.

4. With the scope still connected as in step 1, again observe the waveforms and verify the following:

   a. The output is TRI-STATE.
   b. The amplitude is ±5 ±.5V peak to peak.
   c. The period of the data word is 320 ±10uS.
   d. The time between data words is 25 ±2mS.
   e. The pulse rise and fall times are 1.5 ±.5uS as measured between the 10% and 90% voltage amplitude points on the leading and trailing edges of the pulse.
   f. The signal on channel 1 of the scope is the exact inverse of the signal on channel 2.

5.2.3.5 General Checkout

1. Enter 2 or 3 random transmit words and rates and verify that the received data and rates are always identical.

2. With the unit ON and the charger plugged in, monitor the charge current and verify that when the charge plug is wiggled in the jack the charge current does not vary.

5.2.3.6 Final Check and Adjustment

1. Install cover and verify that the push buttons and slide switches operate smoothly without binding or catching on the case.

2. If necessary, adjust the display contrast by looking at the display at a 45 degree viewing angle and adjusting the contrast pot such that the display is barely readable.

5.3 BILLS OF MATERIAL, ASSEMBLY DRAWINGS AND SCHEMATICS

To assist in the maintenance of the Model 429, bills of material, assembly drawings and schematics are included. They are arranged as follows:

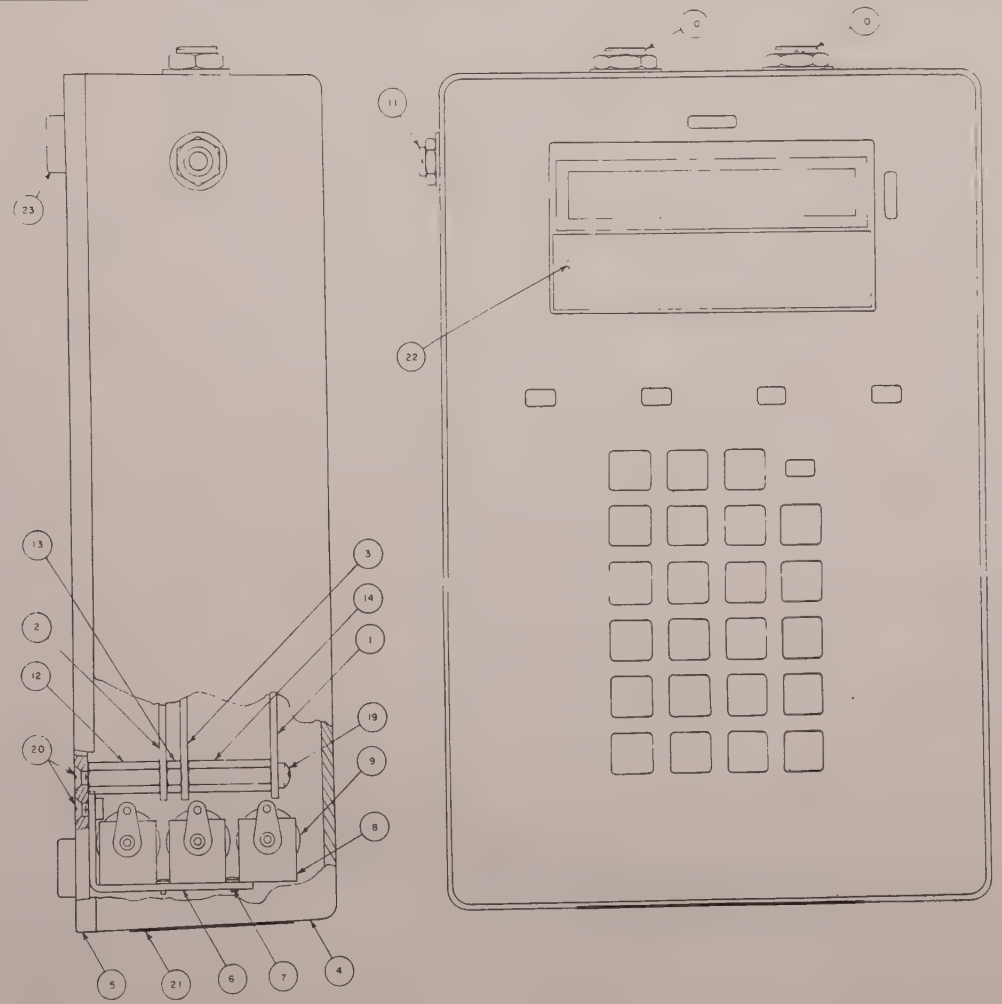
DRAWING NUMBER	DESCRIPTION
01-0001-00	Final Assembly B/M
300-0001-00	Final Assembly
002-0001-00	Final Assembly Schematic
20-5037-00	Display Board B/M
300-5037-00	Display Board Assembly
002-5037-00	Display Board Schematic
20-5037-01	Digital Board B/M
300-5037-01	Digital Board Assembly
002-5037-01	Digital Board Schematic
20-5037-02	Analog Board B/M
25-5037-02	Analog Board Assembly
02-5037-02	Analog Board Schematic

JcAIR INC.

NAME: 429 ARINC 429 TX/RX ASSY NO: 01-0001-00

REVISION: 02 DATE: 04/04/89

ITEM/ SYMBOL	JcAIR PART NO.	DESCRIPTION	U/M	QTY
1	55-0001-00	CABLE ASSEMBLY 50 PIN	EA	1.00
2	55-0001-01	CABLE ASSEMBLY 14 PIN	EA	1.00
3	43-0001-00	BATTERY NICAD 1.2V AA	EA	6.00
4	47-0035-01	CASE 429	EA	1.00
5	47-0038-00	BATTERY BRACKET	EA	1.00
6	57-0001-00	SERIAL TAG 429	EA	1.00
7	57-5001-00	LABEL DISPLAY	EA	1.00
8	90-0453-01	HOLDER BATTERY	EA	1.00
9	90-0004-00	RUBBER FEET SELF-STICK	EA	4.00
10	98-1201-15	RIVET POP .125 X .234	EA	2.00
11	51-0000-03	HEAT SHRINK BLACK .125" ID X .500"	IN	7.00
12	89-2104-06	SCREW PHP #4-40 X .375	EA	4.00
13	89-4104-04	SCREW FHP #4-40 X .250 82^	EA	6.00
14	89-0004-00	WASHER FLAT #4	EA	4.00
15	89-0904-00	WASHER LOCK #4	EA	4.00
16	92-1113-10	SPACER F/F #4-40 X .625	EA	4.00
17	92-1113-12	SPACER F/F #4-40 X .750	EA	4.00
18	94-1113-02	SPACER M/M #4-40 X .125	EA	4.00
19	92-6662-01	SPACER F/F #4-40 X .063	EA	8.00
20	20-5037-00	429 DISPLAY BOARD	EA	1.00
21	20-5037-01	429 DIGITAL BOARD	EA	1.00
22	20-5037-02	ANALOG BOARD	EA	1.00
REF1	02-0001-00	SCHEMATIC FINAL ASSEMBLY	EA	-
REF2	25-0001-00	ASSY DWG FINAL ASSEMBLY 429	EA	-
REF3	01-0001-00	429 ARINC 429 TX/RX	EA	-



REVISIONS

ZONE	REV	DESCRIPTION	DATE	APPROVED

PARTS LIST

QTY REQD	FSCM NO.	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
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NEXT ASSY | USED ON

APPLICATION

DO NOT SCALE DRAWING

CONTRACT NO

APPROVALS	DATE
DRAWN	3/3/84
CHECKED	
ISSUED	

JcAIR INSTRUMENTATION

FINAL ASSEMBLY

SIZE	FSCM NO	DWG. NO.	REV
D		300-0001-00	/

SCALE 3 : 1 | JcAIR "420" | SHEET

JcAIR
300-0001-00

© MENTOR GRAPHICS, INC
REPRODUCTION NO. 70117

JcAIR INC.

NAME: 429 DISPLAY BOARD

ASSY NO: 20-5037-00

REVISION: 01

DATE: 06/01/89

ITEM/ SYMBOL	JcAIR PART NO.	DESCRIPTION	U/M	QTY
1	09-5037-00	PCB DISPLAY 429	EA	1.00
2	30-2027-50	CONN POST HEADER DBL ROW 50 PIN	EA	1.00
3	33-0028-00	SOCKET SINGLE MINI SPRING	EA	13.00
4	89-0004-00	WASHER FLAT #4	EA	2.00
5	89-2104-04	SCREW PHP #4-40 X .250	EA	2.00
C101	CA-1010-14	CAP AL 1UF 35V	EA	4.00
C102	CA-1010-14	CAP AL 1UF 35V	EA	-
C103	CA-1010-14	CAP AL 1UF 35V	EA	-
C104	CA-1010-14	CAP AL 1UF 35V	EA	-
C105	CD-1104-40	CAP MP .1UF 50V 5%	EA	1.00
C106	CF-0102-33	CAP CD 1000PF 100V +80-20% Z5V	EA	1.00
CR101	07-7006-00	LED RED	EA	4.00
CR102	07-7006-00	LED RED	EA	-
CR103	07-7006-00	LED RED	EA	-
CR104	07-7006-00	LED RED	EA	-
DS101	37-0001-00	DISPLAY LCD	EA	1.00
Q101	07-0132-00	XSTR NPN 2N2222A	EA	1.00
R101	RB-0102-23	RES CF 1K QW 5%	EA	4.00
R102	RB-0102-23	RES CF 1K QW 5%	EA	-
R103	RB-0102-23	RES CF 1K QW 5%	EA	-
R104	RB-0102-23	RES CF 1K QW 5%	EA	-
R105	RB-0474-23	RES CF 470K QW 5%	EA	2.00
R106	RB-0474-23	RES CF 470K QW 5%	EA	-
R107	RB-0333-23	RES CF 33K QW 5%	EA	1.00
R108	RB-0334-23	RES CF 330K QW 5%	EA	1.00
R109	RB-0223-23	RES CF 22K QW 5%	EA	1.00
S101	31-0002-00	SWITCH SLIDE SPST PC MOUNT	EA	5.00
S102	31-0002-00	SWITCH SLIDE SPST PC MOUNT	EA	-
S103	31-0002-00	SWITCH SLIDE SPST PC MOUNT	EA	-
S104	31-0002-00	SWITCH SLIDE SPST PC MOUNT	EA	-
S105	31-0002-00	SWITCH SLIDE SPST PC MOUNT	EA	-
S106	31-5001-17	SWITCH PUSHBUTTON SPST NO "RX TRP"	EA	1.00
S107	31-5001-18	SWITCH PUSHBUTTON SPST NO "TX LBL"	EA	1.00
S108	31-5001-19	SWITCH PUSHBUTTON SPST NO "RX STP"	EA	1.00
S109	31-5001-20	SWITCH PUSHBUTTON NO "RX LBL"	EA	1.00
S110	31-5001-21	SWITCH PUSHBUTTON SPST NO "TX DAT"	EA	1.00
S111	31-5001-22	SWITCH PUSHBUTTON SPST NO "TX RAT"	EA	1.00
S112	31-5001-23	SWITCH PUSHBUTTON SPST NO "ENT"	EA	1.00
S113	31-5001-12	SWITCH PUSHBUTTON SPST NO "C"	EA	1.00
S114	31-5001-13	SWITCH PUSHBUTTON SPST NO "D"	EA	1.00
S115	31-5001-14	SWITCH PUSHBUTTON SPST NO "E"	EA	1.00
S116	31-5001-15	SWITCH PUSHBUTTON SPST NO "F"	EA	1.00
S117	31-5001-08	SWITCH PUSHBUTTON SPST NO "8"	EA	1.00
S118	31-5001-09	SWITCH PUSHBUTTON SPST NO "9"	EA	1.00
S119	31-5001-10	SWITCH PUSHBUTTON SPST NO "A"	EA	1.00
S120	31-5001-11	SWITCH PUSHBUTTON SPST NO "B"	EA	1.00
S121	31-5001-04	SWITCH PUSHBUTTON SPST NO "4"	EA	1.00
S122	31-5001-05	SWITCH PUSHBUTTON SPST NO "5"	EA	1.00
S123	31-5001-06	SWITCH PUSHBUTTON SPST NO "6"	EA	1.00
S124	31-5001-07	SWITCH PUSHBUTTON SPST NO "7"	EA	1.00

JcAIR INC.

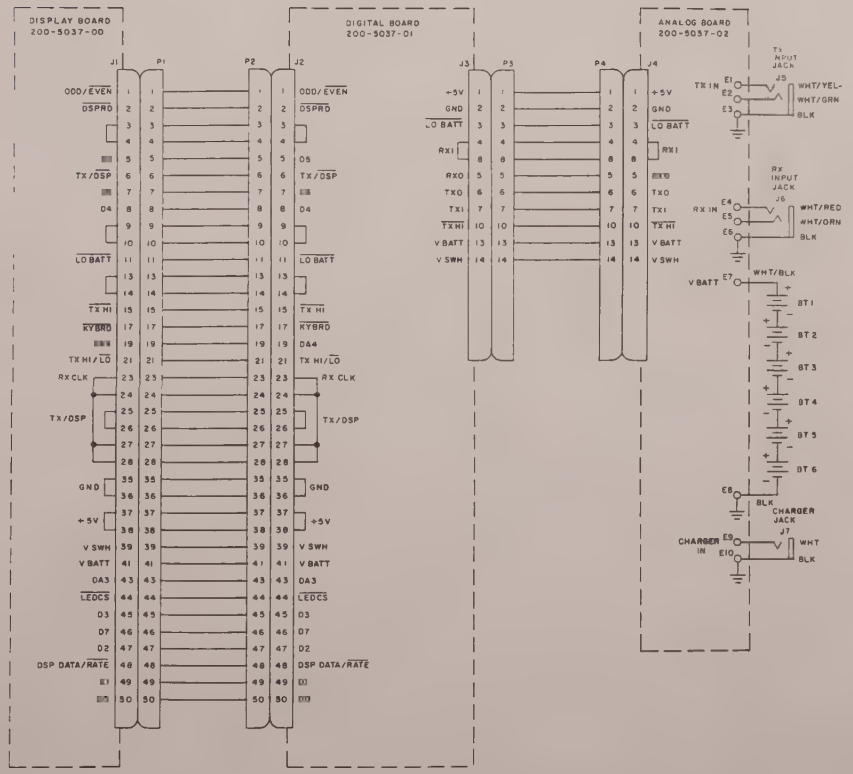
NAME: 429 DISPLAY BOARD

ASSY NO: 20-5037-00

REVISION: 01

DATE: 06/01/89

ITEM/ SYMBOL	JcAIR PART NO.	DESCRIPTION	U/M	QTY
S125	31-5001-16	SWITCH PUSHBUTTON SPST NO "0"	EA	1.00
S126	31-5001-01	SWITCH PUSHBUTTON SPST NO "1"	EA	1.00
S127	31-5001-02	SWITCH PUSHBUTTON SPST NO "2"	EA	1.00
S128	31-5001-03	SWITCH PUSHBUTTON SPST NO "3"	EA	1.00
U101	12-7405-00	IC 74C922 KEY ENCODER	EA	2.00
U102	12-7405-00	IC 74C922 KEY ENCODER	EA	-
U103	12-7545-00	IC 74C374	EA	2.00
U104	12-7545-00	IC 74C374	EA	-
U105	12-7542-00	IC 74HC373 D-TYPE 3-STATE OCTAL XCVR	EA	1.00
REF1	02-5037-00	SCHEMATIC DISPLAY BOARD 429	EA	1.00
REF2	25-5037-00	ASSY DWG DISPLAY BOARD 429	EA	1.00
REF3	20-5037-00	429 DISPLAY BOARD	EA	1.00



DWG. NO	SH	REV

REVISIONS

ZONE	REV	DESCRIPTION	DATE	APPROVED

QTY REQD	FSCM NO	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE
FRACTIONS DECIMALS ANGLES
XX ±
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MATERIAL

FINISH

NEXT ASSY | USED ON

APPLICATION

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CONTRACT NO

APPROVALS	DATE
DRAWN	1/4/84
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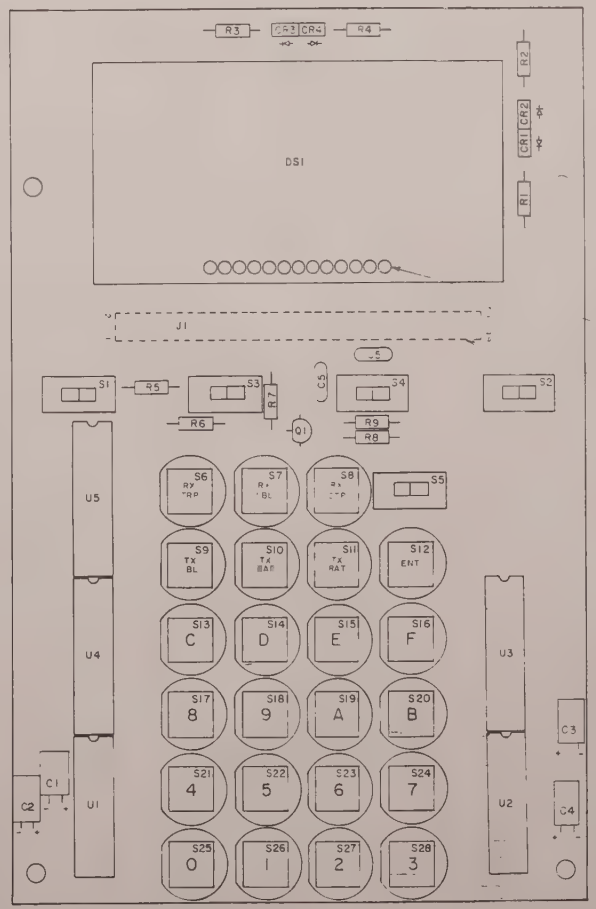
JcAIR INSTRUMENTATION

SCH, CHASSIS

SIZE	FSCM NO	DWG. NO	REV
D		002-0001-00	3

SCALE JcAIR "498" SHEET 1 of 1

JcAIR
002-0001-00 / -



REVISIONS

ZONE	DESCRIPTION	DATE	APPROVED

PARTS LIST

QTY REQD	FSCM NO	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS DECIMALS ANGLES
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MATERIAL

FINISH

NEXT ASSY USED ON

APPLICATION

DO NOT SCALE DRAWING

CONTRACT NO

APPROVALS DATE

DRAWN 12/12/83

CHECKED

ISSUED

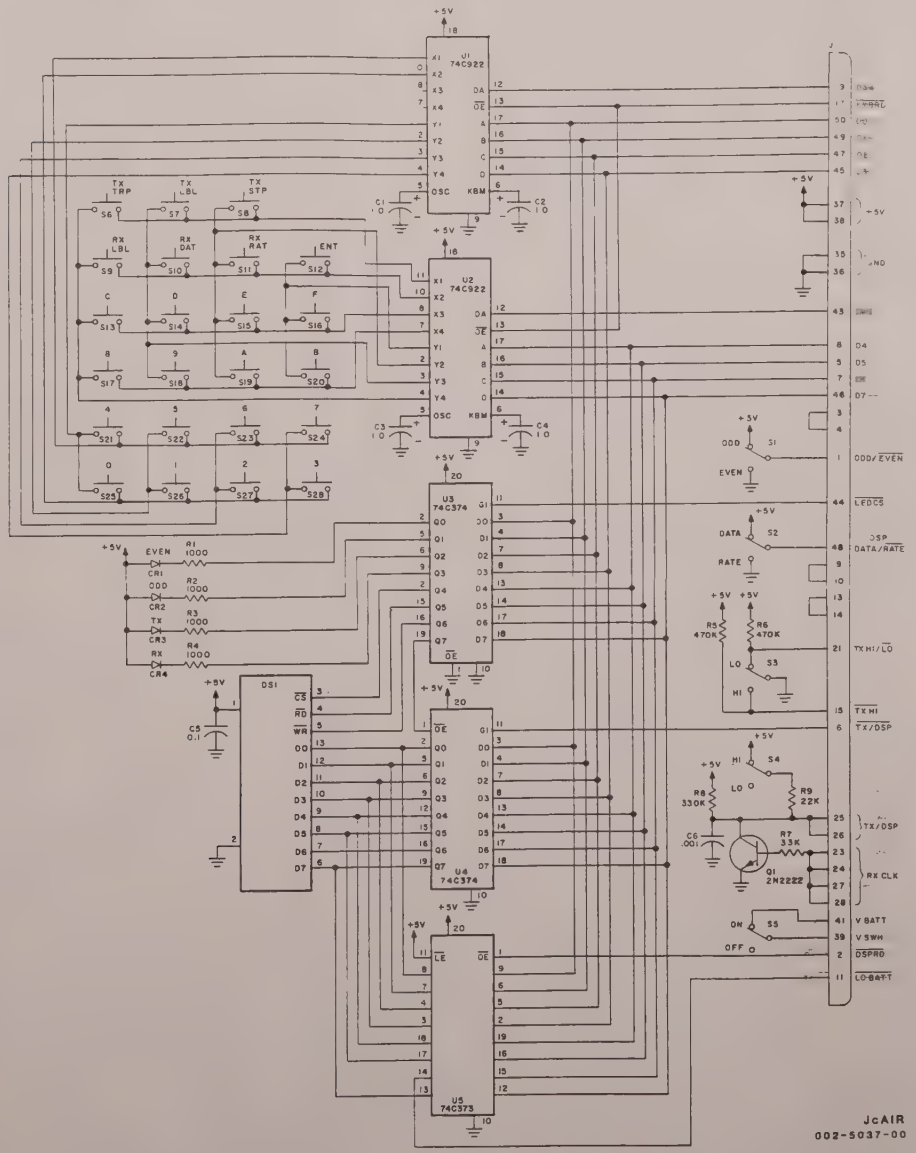
JcAIR INSTRUMENTATION

ASSY. DISPLAY BD

SIZE	FSCM NO	DWG. NO	REV
C		300-5037-00	2

SCALE 2 / 1 JcAIR "429" SHEET

BISHOP GRAPHICS, INC REORDER NO 20511



DWG NO	SH	REV

REVISIONS

ZONE	REV	DESCRIPTION	DATE	APPROVED

PARTS LIST

QTY REQD	FSCM NO	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE
FRACTIONS DECIMALS ANGLES
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MATERIAL

FINISH

NEXT ASSY | USED ON

APPLICATION

DO NOT SCALE DRAWING

CONTRACT NO

APPROVALS	DATE
DRAWN	12/2/83
CHECKED	
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JcAIR INSTRUMENTATION

SCH, DISPLAY BD

SIZE	FSCM NO	DWG NO	REV
D		002-5037-00	2

SCALE JcAIR "429" SHEET 1 of 1

JcAIR INC.

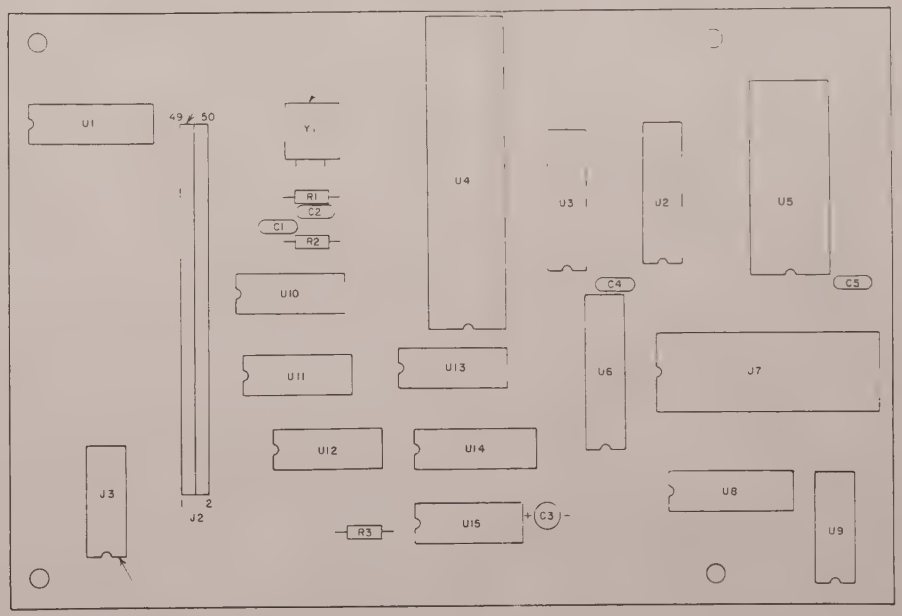
NAME: 429 DIGITAL BOARD ASSY NO: 20-5037-01

REVISION: 01 DATE: 06/01/89

ITEM/ SYMBOL	JcAIR PART NO.	DESCRIPTION	U/M	QTY
1	09-5037-01	PCB DIGITAL 429	EA	1.00
2	33-0005-14	SOCKET IC 14 PIN	EA	1.00
3	30-2027-50	CONN POST HEADER DBL ROW 50 PIN	EA	1.00
C201	CF-1330-51	CAP CD 33 PF 500V 10% Y5P	EA	1.00
C202	CF-1390-51	CAP CD 39 PF 500V 10% Y5P	EA	1.00
C203	CA-1100-13	CAP AL 10UF 25V	EA	1.00
C204	CD-1104-40	CAP MP .1UF 50V 5%	EA	2.00
C205	CD-1104-40	CAP MP .1UF 50V 5%	EA	-
R201	RB-0105-23	RES CF 1M QW 5%	EA	1.00
R202	RB-0101-23	RES CF 100 QW 5%	EA	1.00
R203	RB-0563-23	RES CF 56K QW 5%	EA	1.00
U201	12-7535-00	IC 74HC138 3-8 LN DECODER/DEMULTIPLEXER	EA	1.00
U202	12-7508-00	IC HM3-6514B-9	EA	2.00
U203	12-7508-00	IC HM3-6514B-9	EA	-
U204	12-7507-00	IC 65SC05 AP-1	EA	1.00
U205	12-7424-00	IC 27C32-45 4K X 8 EPROM	EA	1.00
U206	12-7542-00	IC 74HC373 D-TYPE 3-STATE OCTAL XCVR	EA	1.00
U207	12-7506-00	IC 1878 UPROCESSOR DUAL COUNTER/TIMER	EA	1.00
U208	12-7402-00	IC 4094 8-STAGE SHIFT REG	EA	1.00
U209	12-7237-00	IC 4081 QUAD 2-INPUT AND GATE	EA	2.00
U210	12-7238-00	IC 4069U HEX INVERTER BUFFER	EA	1.00
U211	12-7165-00	IC 4013 DUAL D FLIP/FLOP	EA	2.00
U212	12-7237-00	IC 4081 QUAD 2-INPUT AND GATE	EA	-
U213	12-7165-00	IC 4013 DUAL D FLIP/FLOP	EA	-
U214	12-7206-00	IC 4520 DUAL BINARY UP COUNTER	EA	1.00
U215	12-7400-00	IC 4071B QUAD 2 INPUT OR GATE	EA	1.00
Y201	44-0002-00	XTAL 2.000 MHZ	EA	1.00
REF1	02-5037-01	SCHEMATIC DIGITAL BOARD 429	EA	1.00
REF2	25-5037-01	ASSY DWG DIGITAL BOARD 429	EA	1.00
REF3	20-5037-01	429 DIGITAL BOARD	EA	1.00

REVISIONS

(2) INSULATE CRYSTAL FROM BOARD USING FOAM TAPE



(3)

QTY REQD	FSCM NO	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE
FRACTIONS DECIMALS ANGLES
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CONTRACT NO

APPROVALS DATE

DRAWN 1/5/84

CHECKED

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MATERIAL

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NEXT ASSY USED ON

APPLICATION

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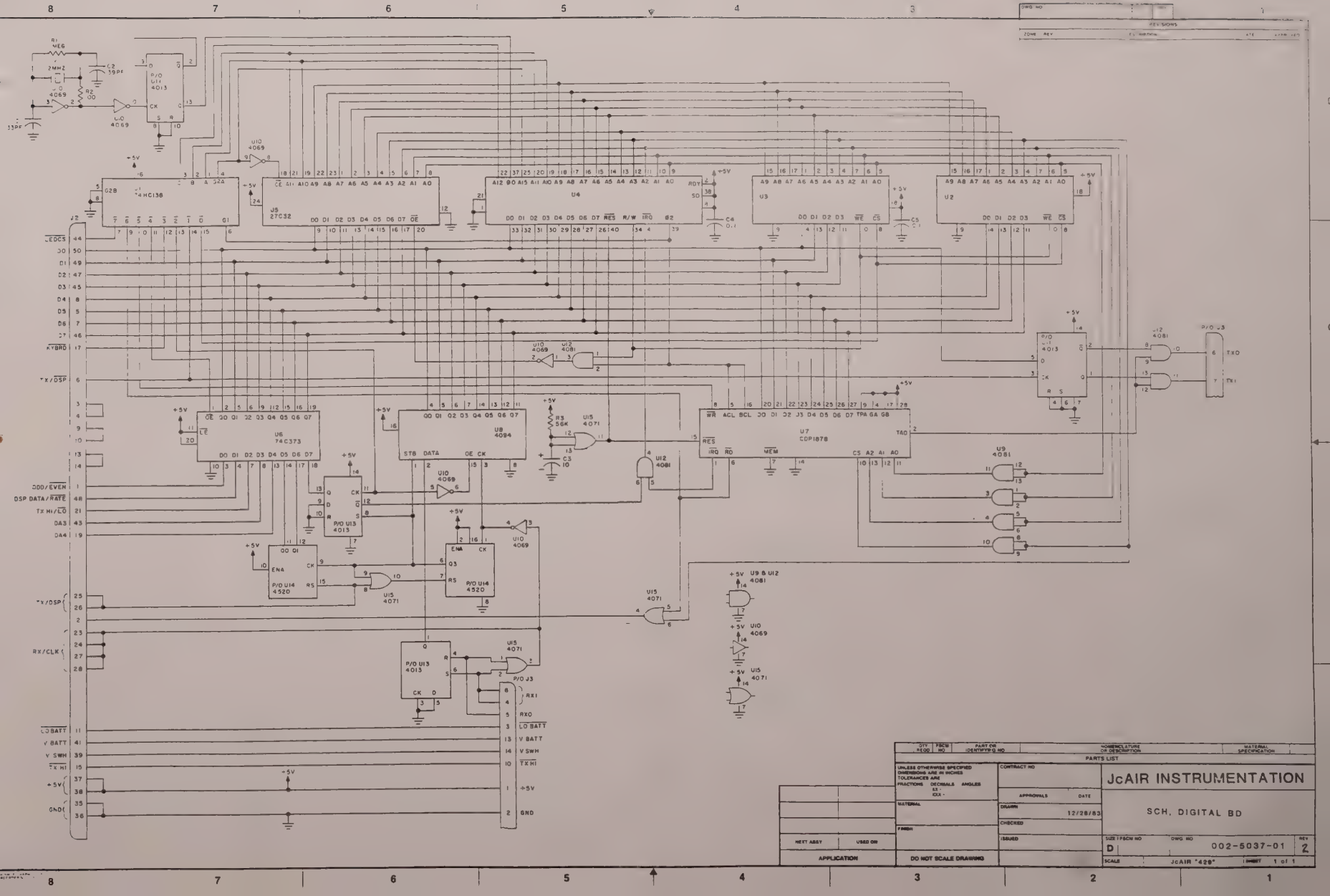
JcAIR INSTRUMENTATION

ASSY, DIGITAL BD

SIZE C | FSCM NO. | DWG NO 300-5037-01 | REV 2

SCALE 2:1 | JcAIR "429" | SHEET 1 of 1

BISHOP GRAPHICS INC REORDER NO 20511


JcAIR INSTRUMENTATION
SCH, DIGITAL BD
002-5037-01
12/28/83
D
2
1 of 1
JcAIR "428"
DO NOT SCALE DRAWING
APPLICATION
PARTS LIST
U1 74HC138
U5 27C32
U4
U3
U2
U6 74C373
U8 4094
U7 CDP1878
U9 4081
U10 4069
U11 4071
U12 4081
U13 4013
U14 4520
P/O J3
RXI
RXO
LO BATT
V BATT
V SWH
TX HI
+5V
GND
TXO
TXI

JcAIR INC.

NAME: ANALOG BOARD ASSY NO: 20-5037-02

REVISION: 03 DATE: 01/10/90

ITEM/ SYMBOL	JcAIR PART NO.	DESCRIPTION	U/M	QTY
1	09-5037-02	PCB ANALOG	EA	1.00
2	24-2224-00	WIRE TEFLON 24 AWG BLK	FT	3.00
3	24-2224-02	WIRE TEFLON 24 AWG RED	FT	1.00
4	24-2224-92	WIRE TEFLON 24 AWG WHITE/RED	FT	1.00
5	24-2224-93	WIRE TEFLON 24 AWG WHITE/ORANGE	FT	1.00
6	24-2224-94	WIRE TEFLON 24 AWG WHITE/YELLOW	FT	1.00
7	24-2224-95	WIRE TEFLON 24 AWG WHITE/GREEN	FT	1.00
8	51-0002-03	TUBING SHRINK CLEAR .125 OD	FT	-
9	51-0002-05	TUBING SHRINK CLEAR .250 OD	FT	1.00
10	24-2224-90	WIRE TEFLON 24 AWG WHITE/BLACK	FT	1.00
C301	CF-1471-51	CAP CD 470PF 500V 10% Y5P	EA	4.00
C302	CF-1471-51	CAP CD 470PF 500V 10% Y5P	EA	-
C303	CF-1101-51	CAP CD 100PF 500V 10% Y5P	EA	5.00
C304	CF-0472-33	CAP CD 4700 PF 100V +80-20% Z5U	EA	2.00
C305	CF-0472-33	CAP CD 4700 PF 100V +80-20% Z5U	EA	-
C306	CF-1101-51	CAP CD 100PF 500V 10% Y5P	EA	-
C307	CF-1470-51	CAP CD 47 PF 500V 10% Y5P	EA	3.00
C308	CF-1101-51	CAP CD 100PF 500V 10% Y5P	EA	-
C309	CF-1100-51	CAP CD 10 PF 500V 10% Y5P	EA	2.00
C310	CD-1104-40	CAP MP .1UF 50V 5%	EA	8.00
C311	CD-1104-40	CAP MP .1UF 50V 5%	EA	-
C312	CF-1471-51	CAP CD 470PF 500V 10% Y5P	EA	-
C313	CF-1101-51	CAP CD 100PF 500V 10% Y5P	EA	-
C314	CF-1470-51	CAP CD 47 PF 500V 10% Y5P	EA	-
C315	CF-1101-51	CAP CD 100PF 500V 10% Y5P	EA	-
C316	CF-1100-51	CAP CD 10 PF 500V 10% Y5P	EA	-
C317	CD-1104-40	CAP MP .1UF 50V 5%	EA	-
C318	CD-1104-40	CAP MP .1UF 50V 5%	EA	-
C319	CF-1471-51	CAP CD 470PF 500V 10% Y5P	EA	-
C320	CD-1104-40	CAP MP .1UF 50V 5%	EA	-
C321	CD-1104-40	CAP MP .1UF 50V 5%	EA	-
C322	CD-1104-40	CAP MP .1UF 50V 5%	EA	-
C323	CF-1470-51	CAP CD 47 PF 500V 10% Y5P	EA	-
C324	CA-1101-11	CAP AL 100UF 10V	EA	1.00
C325	CD-1104-40	CAP MP .1UF 50V 5%	EA	-
C326	CA-1100-13	CAP AL 10UF 25V	EA	2.00
C327	CA-1100-13	CAP AL 10UF 25V	EA	-
CR301	07-6016-00	DIODE SIL 1N4148	EA	3.00
CR302	07-6016-00	DIODE SIL 1N4148	EA	-
CR303	07-6016-00	DIODE SIL 1N4148	EA	-
CR304	07-5082-00	DIODE ZEN 1N4728A V=3.3 5%	EA	1.00
CR305	07-6013-00	DIODE SIL 1N5817	EA	1.00
J304	33-0005-14	SOCKET IC 14 PIN	EA	1.00
Q301	07-0132-00	XSTR NPN 2N2222A	EA	2.00
Q302	07-0136-00	XSTR PNP 2N2907A	EA	3.00
Q303	07-0132-00	XSTR NPN 2N2222A	EA	-
Q304	07-0136-00	XSTR PNP 2N2907A	EA	-
Q305	07-0136-00	XSTR PNP 2N2907A	EA	-
R301	RB-0472-23	RES CF 4.7K QW 5%	EA	4.00
R302	RB-0472-23	RES CF 4.7K QW 5%	EA	-

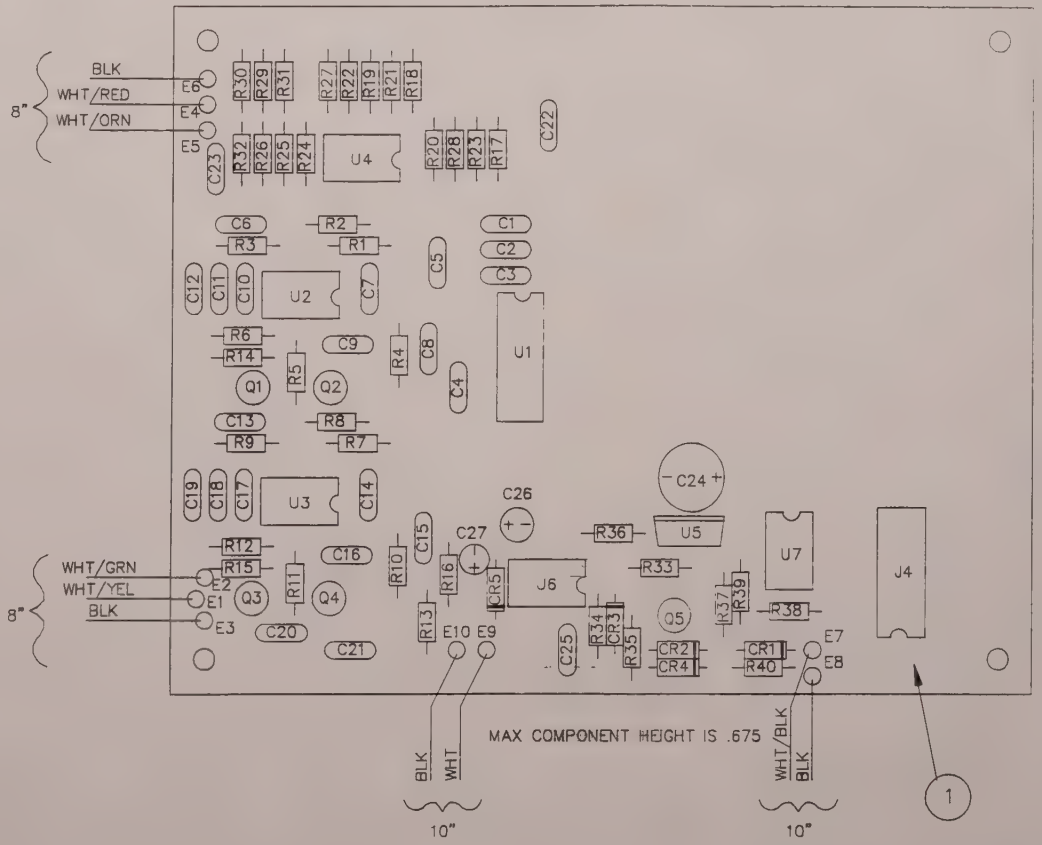
JcAIR INC.

NAME: ANALOG BOARD ASSY NO: 20-5037-02

REVISION: 03 DATE: 01/10/90

ITEM/ SYMBOL	JcAIR PART NO.	DESCRIPTION	U/M	QTY
R303	RB-0562-23	RES CF 5.6K QW 5%	EA	4.00
R304	RB-0562-23	RES CF 5.6K QW 5%	EA	-
R305	RB-0102-23	RES CF 1K QW 5%	EA	6.00
R306	RB-0471-23	RES CF 470 QW 5%	EA	2.00
R307	RB-0472-23	RES CF 4.7K QW 5%	EA	-
R308	RB-0472-23	RES CF 4.7K QW 5%	EA	-
R309	RB-0562-23	RES CF 5.6K QW 5%	EA	-
R310	RB-0562-23	RES CF 5.6K QW 5%	EA	-
R311	RB-0102-23	RES CF 1K QW 5%	EA	-
R312	RB-0471-23	RES CF 470 QW 5%	EA	-
R313	RB-0560-23	RES CF 56 QW 5%	EA	2.00
R314	RB-0390-23	RES CF 39 QW 5%	EA	2.00
R315	RB-0390-23	RES CF 39 QW 5%	EA	-
R316	RB-0560-23	RES CF 56 QW 5%	EA	-
R317	RB-0103-23	RES CF 10K QW 5%	EA	2.00
R318	RB-0120-23	RES CF 12 QW 5%	EA	2.00
R319	RB-0563-23	RES CF 56K QW 5%	EA	2.00
R320	RB-0183-23	RES CF 18K QW 5%	EA	2.00
R321	RB-0102-23	RES CF 1K QW 5%	EA	-
R322	RB-0102-23	RES CF 1K QW 5%	EA	-
R323	RB-0103-23	RES CF 10K QW 5%	EA	-
R324	RB-0563-23	RES CF 56K QW 5%	EA	-
R325	RB-0120-23	RES CF 12 QW 5%	EA	-
R326	RB-0102-23	RES CF 1K QW 5%	EA	-
R327	RB-0102-23	RES CF 1K QW 5%	EA	-
R328	RB-0183-23	RES CF 18K QW 5%	EA	-
R329	RB-0123-23	RES CF 12K QW 5%	EA	2.00
R330	RB-0681-23	RES CF 680 QW 5%	EA	3.00
R331	RB-0123-23	RES CF 12K QW 5%	EA	-
R332	RB-0681-23	RES CF 680 QW 5%	EA	-
R333	RB-0018-23	RES CF 1.8 QW 5%	EA	1.00
R334	RB-0220-23	RES CF 22 QW 5%	EA	1.00
R335	RB-0681-23	RES CF 680 QW 5%	EA	-
R336	RB-0047-23	RES CF 4.7 QW 5%	EA	1.00
R337	RC-4993-12	RES MF 499K EW 1%	EA	1.00
R338	RB-0106-23	RES CF 10M QW 5%	EA	1.00
R339	RC-1822-12	RES MF 18.2K EW 1%	EA	1.00
R340	RB-0150-23	RES CF 15 QW 5%	EA	1.00
U301	12-7138-00	IC 4016 QUAD ANALOG SWITCH	EA	1.00
U302	12-7315-00	IC 3130 BIMOS OP AMP	EA	2.00
U303	12-7315-00	IC 3130 BIMOS OP AMP	EA	-
U304	12-7225-00	IC LM393 DUAL VOLTAGE COMP	EA	1.00
U305	12-7491-00	IC LM2931T-5.0 5V REG LOW DROP	EA	1.00
U306	12-7492-00	IC 7660 VOLTAGE CONVERTER	EA	1.00
U307	12-7490-00	IC LM10CLN LOW VOLT DETECTOR	EA	1.00
REF1	02-5037-02	SCHEMATIC ANALOG BOARD	EA	1.00
REF2	25-5037-02	ASSY DWG ANALOG BOARD	EA	1.00

REV	DESCRIPTION	DATE	APP'D
5	CONVERT TO R (NOT SYSTEM	8/88	BLP



429EX	01-1001-05
429EB	01-1001-10
429E	01-1001-00
429	01-0001-00

UNIT	NEXT ASSY.	QTY	PART NO.	DESCRIPTION	ITEM

DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACT ± DECIMAL ± .XX .XXX ANGLES ±

MATERIAL

FINISH

CONTRACT NO

APPROVALS	DATE
DRAWN BLP	10/88
CHECKED	
ISSUED	

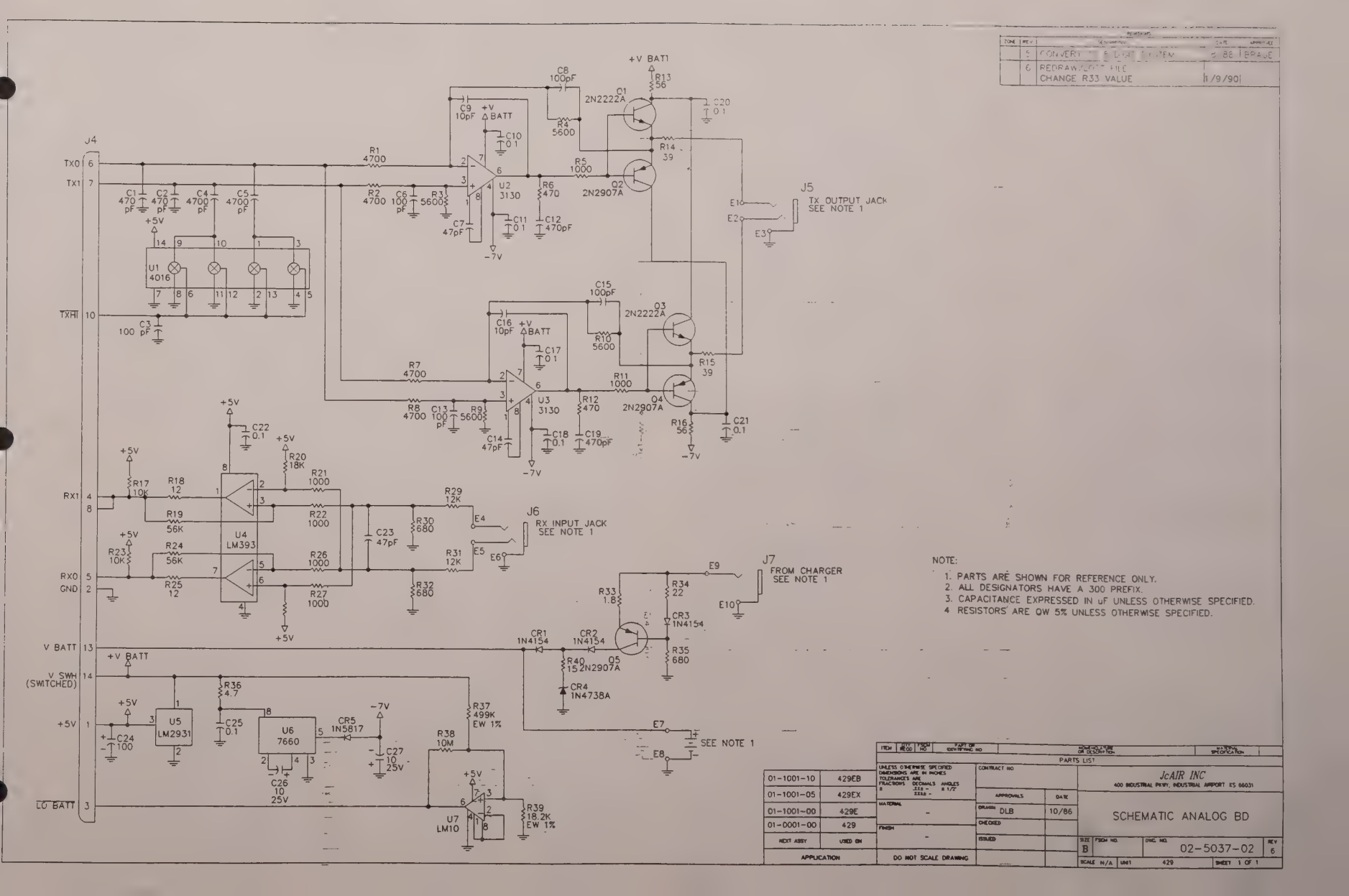
NOT TO SCALE

INC.
400 INDUSTRIAL PKWY.
INDUSTRIAL AIRPORT,
KANSAS 66031

ASSEMBLY ANALOG BD

SIZE B | DWG. NO. 25-5037-02 | SHT 1 OF 1 | REV. 5

NOTES:
1) ALL DESIGNATORS HAVE A 300 PREFIX.



NOTE:

1. PARTS ARE SHOWN FOR REFERENCE ONLY.
2. ALL DESIGNATORS HAVE A 300 PREFIX.
3. CAPACITANCE EXPRESSED IN uF UNLESS OTHERWISE SPECIFIED.
4. RESISTORS ARE QW 5% UNLESS OTHERWISE SPECIFIED.

01-1001-10	429EB
01-1001-05	429EX
01-1001-00	429E
01-0001-00	429
NEXT ASSY	USED ON
APPLICATION	

ITEM | QTY REQD | FIND NO | PART OR IDENTIFYING NO | NOMENCLATURE OR DESCRIPTION | MATERIAL SPECIFICATION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE
FRACTIONS ± DECIMALS .XX ± .XXX ± ANGLES ± 1/2°

MATERIAL –

FINISH –

DO NOT SCALE DRAWING

CONTRACT NO

APPROVALS	DATE
DRAWN DLB	10/86
CHECKED	
ISSUED	

JcAIR INC
400 INDUSTRIAL PKWY, INDUSTRIAL AIRPORT KS 66031

SCHEMATIC ANALOG BD

SIZE B | FSCM NO. | DWG NO. 02-5037-02 | REV 6
SCALE N/A | UNIT 429 | SHEET 1 OF 1

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